

R E M A R K S

1. Reconsideration and further prosecution of the above-identified application are respectfully requested in view of the discussion that follows. Claims 11-30 are pending in this Application.

Claims 11-30 have been rejected under 35 U.S.C. §102(a) as being obvious over U.S. Patent No. 5,333,200 to Cooper et al. After a careful review of the claims (as amended), it has been concluded that the rejections are in error and the rejections are, therefore, traversed.

2. Claims 11-30 have been rejected as being obvious over Cooper et al. In response, claims 11, 14, 17, 25 and 27 have been further limited to the context "wherein the plurality of other listeners all listen simultaneously". Support for the additional limitation may be found at least in FIG. 2 which shows groups G_0 and G_1 listening simultaneously in different listening spaces.

New claim 31 has been added. New claim 31 is similar to claim 20 except that it is limited to a plurality of listeners and at least three speakers in the second space. Support for at least three speakers may be found in FIGs. 9a-e of the specification.

New claim 32 has been added. New claim 32 is similar to claim 20 except that it is limited to at least three speakers and to the context "wherein the second listener is not located symmetrically with respect to the at least three speakers. Support for this further limitation may be found in FIGs. 9b or 9h of the specification.

In contrast, Cooper et al. is directed to a system which formats binaural signals for only a single listener at a time.

Since Cooper et al. does not teach or suggest the concept of multiple users in another listening space hearing the binaural impression of a first listener at the first listener's location, Cooper et al. does not teach each and every claim limitation. Since Cooper et al. does not teach and every claim limitation, the rejection is now improper and should be withdrawn. Since claims 11, 14, 17, 25 and 27 are now allowable, then so to are dependent claims 12, 13, 15, 16, 18, 19, 26, 28, 29 and 30.

In addition, claim 14 clearly requires that the speaker layout in the first space be the same as the speaker layout in the second space. The utility of Claim 14 is that it allows for the possibility of having several people in the second space experience substantially the same impression as the single person in the first space. This is significant because, for example, ordinary home theaters, not practicing the invention, have a preferred sweet spot which is in the center of the five-speaker layout. Claim 14 permits the creation of two sweet spots, each providing the same impression as the single sweet spot, while using the same five-speaker layout that is normally used in home theater.

Cooper et al. shows different layouts but the same number of listeners (one), whereas Claim 14 requires the same layout but more than one listener in the second space.

Claim 17 is substantially the same as claim 14 with the important exception that there is no requirement that the speaker layout in the second space be the same as the speaker layout in the first space, or that the numbers of speakers in the two spaces be the same. Cooper et al. is non-anticipatory because claim 17, allows for more than one listener in the second space whereas Cooper et al. allowed only one. The two-listener scenario in, Fig. 18 of Cooper et al. is non-anticipatory because one of the listeners receives an undesired spatial impression. More

specifically, "The design is for the second head 684 to hear reverse stereo" (Cooper et al., col. 23, lines 13-14). Also, Cooper et al. taught the use of only two speakers in the second space (Fig. 18 notwithstanding), whereas the invention teaches an arbitrary number (but greater than 1).

The Examiner's remark about Claim 19 is not understood, since "a specific loudspeaker bearing angle, say $\pm 30^\circ$ " is an actual, real space, and not a conceptual or simulated space. Claim 19 bears on the ability to manufacture audio spaces, or "landscapes," which have no direct correspondence to anything that ever existed in reality. In any event, the independent claim stands on its own novelty.

Claim 20 has been further limited to more than four speakers. The further limitation is supported at least by FIGs. 9a and 9c.

Since Cooper et al. is limited to four speakers, claim 20 is now clearly differentiated from Cooper et al. Since claim 20 is now limited to more than four speakers, the rejection of claim 20 is now improper and should be withdrawn.

With regard to claim 23, the Examiner references Cooper et al. (col. 22, lines 3-56) as examples of sums or differences of matrices. In this regard, the Examiner is mistaken, as all of the quantities which are summed or differenced in the referenced material are *scalar* quantities, i.e., ordinary transfer functions. There are indeed matrix computations but they are all plainly set out from the text as stand-alone equations involving large square brackets. There are no symbolic names given to these matrices, as the indicated calculations are carried out using explicit entries into the square bracket quantities, the matrices.

With regard to claim 25, it is believed that rather than Fig. 10s, which doesn't exist, Examiner means Fig. 18 which shows

the second-space layout with three evenly-spaced speakers and two listeners placed symmetrically with respect to the speakers, with one listener getting an undesired, reversed image. The undesirability may result from, for example, a symphonic music lover hearing the symphony displayed backwards—symphony orchestras have a traditional arrangement with various instruments and instrument sections always in the same relative place on the stage. Claims 25 and 27 are clearly drawn to "recreating acoustic perception(s);" a reversed image is not a recreation. The function of Fig. 18 is made clear in Cooper et al., column 23, lines 13 and 14: "The design is for the second head 684 to hear reverse stereo, namely $L'=R$ and $R'=L$."

Examiner states, "Cooper... fails to show there is more than one listener in a first space." Claims 25 and 27 both require more than one listener in the first space, so the relevance of the remark is not clear.

Examiner states, "[Cooper's method of recreating applies] ...for more than one listener in a second space..." (Office Action of 6/2/95, page 4) but by the discussion about Fig. 18 above, this is not true.

Examiner then discusses a scenario (Office Action of 6/2/05, pages 4-5) in which several speaker orientations in the first space could have a reformatter designed for each orientation, thus offering a plurality of acoustic perceptions. A listener in the second space ("user") could then select which of the speaker orientations from the first space that is to be recreated. However claim 25 is now limited to the context requiring that the one or more acoustic perceptions be recreated simultaneously.

Cooper et al. teaches *only* symmetrical situations so only two transfer functions, A and S, are necessary. With symmetry, the transfer function from the left speaker to the left ear is

the same as from the right speaker to the right ear; we call this S . Also, the transfer function from the left speaker to the right ear is the same as the transfer function from the right speaker to the left ear; we call this A . If the listener is not symmetrically placed between the speakers, as the Examiner's scenario requires, then four unique transfer functions are necessary to describe the situation; one from each speaker to each ear. This is not taught by Cooper et al.. Therefore, the teachings of Cooper et al. fail in the Examiner's scenario, which would require, say, A , B , S , T transfer functions.

If the several listeners in the second space of the Examiner's scenario are present simultaneously, then Examiner's proposed solution to his scenario will fail. He proposes setting up an ordinary, Cooper-style, two-speaker crosstalk canceler for each listener present in the second space. This, he supposes, can be accomplished by each listener, in effect, getting his or her own location-specific A and S transfer functions. In the simultaneous listening supposed in this paragraph, the failure comes because there are more crosstalk paths than are accommodated in Examiner's solution.

First, let us postulate that there are two speakers and four ears, which might fit the Examiner's scenario. He proposes simply calculating an A and an S for each of the listeners. This won't work for two reasons. Because A and S alone imply symmetry, the two listeners would have to be sitting one in front of the other, not a comfortable position for TV viewing. But there is a fundamental problem with this solution. If you compute A_1 and S_1 for the first listener, then go about calculating A_2 and S_2 for the other listener, one is left with the impossible situation of applying cancellation signals from two speakers to four ears. It is exactly the problem encountered by high school algebra students—you have more unknowns (four transfer functions) than

there are variables (speakers). An exact solution is impossible. The text of the application discusses an approach for approximate cancelation for such situations (the pseudoinverse) but this is clearly beyond Cooper et al..

Next, let us postulate that there are four speakers and four ears, so that we can talk about accurate crosstalk cancelation. (This again relates to discussions of the pseudoinverse in the text.) The Examiner seems to propose dividing the speakers into two pairs, matching up one to one with the obvious pairs of ears on the listeners. Then, he proposes treating the problem as two separate, ordinary, Cooper-style crosstalk cancelation problems. This too will fail because the proposed solution does not take into account the *additional crosstalk paths* between "unpaired" speakers and ears. Specifically, listener 1 will get crosstalk from listener 2's speakers. In matrix terms, Examiner's proposed crosstalk cancelation matrix, will have all 0's in the upper right 2x2 submatrix and in the lower left 2x2 submatrix. The *correct* crosstalk canceler, the one taught in the application, has all 16 elements of the 4x4 matrix filled in with non-zero terms.

It is believed that the full-blown, 4x4 solution is non-obvious in the face of decades of people trying to figure out how to do proper audio recording and playback.

The Examiner asserts (Office Action of 6/2/05, page 5) that "Cooper suggests that the reformatter is being used for the speakers on a TV. A TV in a family could be used for more than one listeners." Again, two separate responses are necessary. If the Examiner is suggesting that listeners are present one after another, serially, then the claims have been amended to require simultaneous listening. If the listeners in the family room are present and listening to the TV at the same time, then, indeed, the TV can be used by all of them at once. But a Cooper-style

reformatter is capable of making only *one* sweet spot. (Fig. 18 doesn't apply, as noted elsewhere herein.) But the invention addresses the recreation of multiple desirable acoustic impressions at the same time. This relates to the common concept of the sweet spot. Due to the range of wavelengths involved in sound, especially the shorter wavelengths, only one person can fit into a sweet spot at a time. So, indeed, several people can hear the TV through a Cooper-style reformatter, but only one of them is enjoying the invention; the others will hear intelligible sound but it will not be a proper recreation of any desirable acoustic impression. It is a teaching of the application to create multiple sweet spots.

The Examiner asserts (Office Action of 6/2/05, page 5) that "Cooper shows the first space and second space are anechoic space." Claim 26 allows for "locating a listener of the first space and a listener of the second space in the same space." This has nothing to do with either the first or the second space being anechoic.

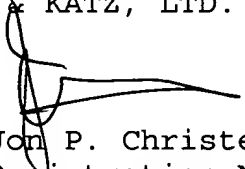
For any of the above reasons, Cooper et al. does not teach or suggest each and every claim limitation. Since Cooper et al. does not teach or suggest each and every claim limitation, the rejections are improper and should be withdrawn.

3. Allowance of claims 11-32, as now presented, is believed to be in order and such action is earnestly solicited. Should the Examiner be of the opinion that a telephone conference would expedite prosecution of the subject application, he is respectfully requested to telephone applicant's undersigned attorney.

Respectfully submitted,

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